DOCUMENT RESUME

ED 048 157 24 SP 007 029

TITLE	Don't Spare the Rods. A Supplementary Mathematics Program for Kindergartens.
INSTITUTION	University City School District, Mo.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C. Bureau of Research.
BUREAU NO	ER-6-1328
CONTRACT	OEC-3-7-061328-0322
NOTE	42p.
EDRS PRICE	EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS	*Curriculum Guides, *Kindergarten, *Mathematics Curriculum
IDENTIFIERS	*Cuisenaire Rods

ABSTRACT

GRADES OR AGES: Kindergarten. SUBJECT MATTER: Using Cuisenaire rods. ORGANIZATION AND PHYSICAL APPEARANCE: The guide contains a short introductory section followed by a sequential series of 40 lessons. Diagrams are interspersed throughout the text. The guide is mimecgraphed and spiral bound with a soft cover. OBJECTIVES AND ACTIVITIES: The introductory section describes the objectives of using Cuisenaire rods. Each lesson contains a detailed sequence of activities with the rods designed to teach children number concepts and operations. INSTRUCTIONAL MATERIALS: A list of Cuisenaire rods kits available and prices is presented in the introductory section. A set of transparencies and a set of self-checking cards which can be used with the lessons are available from the Prekindergarten-Kindergarten Research Center. However, the lessons can be taught without the transparencies and cards. STUDENT ASSESSMENT: None. OPTIONS: No alternative activities are suggested. It is necessary to follow the lessons in sequence, but timing is left to the teacher. (RT)

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DON'T SPARE THE RODS!

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A Supplementary Mathematics Program for Kindergartens

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Foreword

Fun with Cuisenaire Rods has been designed to be used with kindergarten children with an emphasis upon free play and game oriented activities to lay the foundation for more advanced mathematical concepts. Available and to be used with the written program are a set of transparencies and a set of self-checking cards which may be obtained for the Prekindergarten-Kindergarten Research Center when they are needed. The transparencies reinforce activities planned to develop spacial relationships, patterning, the concepts of "trains" and squares. The cards are to be used by an individual child to increase familiarity with the rods emphasizing that two small rods can be equal in length to one of the longer rods. These have been produced in color, with the answers on the back.

Appreciation is expressed to Mrs. Grace Williams for compiling the materials for the program. She has used the activities described and found them to be successful with kindergarten children.

Introduction

The Cuisenaire rods are learning aids to supplement the mathematics program. They can be used in preceptual training, too.

These lessons were designed as aids for the beginning teacher of the rods. It is not necessary to have training in Cuisenaire methods to use this material. The teacher will learn with the children and from the children. It's fun....try it!

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Perceptual Training Using Cuisenaire Rods

The appeal of the rods develops the sensory perceptions of the child as he "see," "touches", and "feels" the rods. The colors are pleasing, the shapes and lengths are intriguing and the wood surface delights the child's sense of touch. The teacher for the most part will use the rods as a learning aid to arouse the child's mathematical instinct. The Cuisenaire rods are an excellent and appropriate readiness tool to give a child practice in preceptual skills to develop learning ability.

Visual-Motor Skills.....Just seeing and manipulating the rods will make for improvement in visual-motor functioning. During the play activities this basic skill is being developed.

Visual Memory of Spacial Relationships.....This is a readiness skill that the child needs for beginning reading. Test 9 in the ITPA gives indication of the child's ability of this skill in relation to his age. The teacher can use transparencies 1 through 10 on the overhead projector with the rods to give a child practice in this skill. The classroom needs to be set up so children can view the projection screen from their tables and work with the rods at the same time.

Directions for use of Transparencies #1 through 10 for Visual Memory

1. Children are seated so they can view screen and use rods at the same time.

2. Image of one pattern on transparency #1 is projected on screen. The other pattern on sheet will be blocked out if a plain sheet of paper is placed over that part of transparency.

   Child tells what he sees. In the beginning he tells the colors of the rods but encourage him to tell if the white rod is to the left of the orange rod or the orange rod is at the right of the white. Tell the children to think about the pattern they see.

3. Turn projector off and ask children to reproduce the pattern they have just seen on the screen with the rods. The tendency

to reverse designs should be called to a child's attention. After a child has made his pattern with the rods, ask him to tell what he has done.

4. Turn the projector on and let children see if they were correct.

5. Give the transparency a 90 degree turn and again go through steps 1 through 4 above. Thus the pattern on each transparency can be used in four positions. The use of transparencies in the above way will give children experience in spacial relationships.

Verbalizing the relative position of the rod is a good language as well as visual experience for the child. In transparencies #1 through 10, children see the rods "above," "below","over", "under", "beside", "before", "after", "next", "in the middle", "in between", "to the right of","to the left of," etc. By turning the transparencies on the projector a quarter turn of a circle or 90 degrees, the tods take a new position.

Gradually, the time spent for studying and talking about the pattern is decreased and the number of rods in the pattern is increased as the child's visual imagery and memory span improve. With training, the teacher flips patterns on and off the screen as fast as possible and children are able to reproduce it: child learns he is,

1. to look
2. to think
3. to do
4. to see if he is correct

This is a fast moving activity and also develops the ability to attend.

Visual memory is being trained when child responds to question, "I am thinking of a rod as long as four white ones."

Auditory Training.....When a child follows the teacher's directions as to take a blue rod and place it end to end with a red rod his auditory memory is being trained with an awareness of correct response on the basis of the rods selected.

The patterns as shown on transparencies #1 through 10 can be used. Examples: 1. "Take a blue rod and palce it under a red rod." After children have reproduced this pattern transparency 2* can be shown on screen.

2. Take a _____rod and place it between a _____ and a _____rod end to end.

Show transparency _____ which has this pattern.

Walking Board for Rod-Released Whole Body Exercises.....Mark off a walking board into ten equal parts, each equivalent to a white rod. Mark each with tape.

Begin with simple sequence stepping, counting aloud as each step is taken. For additional skill the teacher calls out steps for the child to take out of order. Later on the board may be used to reinforce other rod discoveries in adding, subtracting, etc.

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CUISENAIRE RODS

Cuisenaire rods can be an integral part of the kindergarten mathematical program. A child needs many different math experiences for total development. There are inherent mathematical abilities in each child which needs to be brought forth. Cuisenaire rods are related colored rods in units of square centimeters. By manipulating the rods children can gain understanding of increasing and decreasing structure of our number system and progress in classification of math concepts.

The advantage of group activities with Cuisenaire rods are: 1) each child participates in manipulating concrete objects; 2) child gains skill in fine visual-motor expression; 3) Math is fun! Each child succeeds at his level.

General Information

Cuisenaire rods should be easily available for classroom use. The bags of 72 rods are awkward for the kindergarten child to handle. The sets are more available to the child if stored in flat hosiery boxes. The supplementary boxes*of 155 rods are excellent to use with group activities. One box is needed for each group of four children. These boxes are partitioned for each size rod. Children benefit from matching size and color in putting the rods away. Additional sets of white rods will probably be needed.

Item	Description	Unit Price
CX-3D	Classroom Kit(25bags of 72 rods)	$57.50
CG-7	One lot (5bags of 72 rods)	$11.50
* CG -1E	Cuisenaire Rods(Supplementary box of 155)	$ 6.95
CR-W	50 White rods	$ 1.00
CR-WM	1000 White rods	$12.50

Sets Can be purchased from:

Cuisenaire Company of America, Inc.
9 Elm Avenue
Mount Vernon, New York 10550

Free Play

When Cuisenaire rods are first presented to children, a long period of "free play" is recommended. Children benefit from many periods in which they can express themselves creatively and make discoveries of their own. Through "free play" children will unconsciously gain knowledge of many math relationships.

Introduction of Rods

Why not introduce the rods to the whole group with a "spark" of enthusiasm. Children will capture your delight and be off to a good start.

Explain how rods are stored.
It is best to keep rods on the table.

"Be careful of the white one
Because he's little and likes to run."

Let children play with rods. Teacher will view each child's work with delight. A few children may need help in getting started. Help them choose a few rods and proceed. Suggest that children stop working and walk around and view what other children have done. First remind them to be careful. A jar of the table may send rods tumbling. Allow adequate time to put rods away. Remind children to put rods away carefully.

"Were you careful of the white one?
Check your floor and see if he has run!"

Show children where rods are kept in the classroom. Suggest they might like to play with them again during choice time.

The following lessons are suggestions to give a little variety to "free play" activities with the Cuisenaire rods.

Lesson 2

Again let children proceed on their own and do what they please with the rods. It's amazing how creatively children can express themselves. Perhaps children who were hesitant before are better adjusted and more familiar with the rods and can proceed without help this time. Teacher can comment on each child's activity.

Today ask several children to tell what they have made. Again allow plenty of time for housekeeping.

Lesson 3 ..... Something Pretty

As a stimulus to rod play suggest that the children make "something pretty." Some may make flat designs or patterns and others may build in 3 D- as with blocks.

Teacher notices what each child is doing. Choose a child at each table to choose one he likes. Have that child tell about it.

Other variations to make:

Something funny
Something big
Something little
Make a house
Make a railroad track

Lesson 4.....Cuisenaire Picture

Suggest that the children make a picture using the rods. The children may enjoy viewing each other's work again. Choose a few children to talk about their effort.

Math note to Teacher..... The seed for understanding the "one more" concept should be planted early in the year. The "one more" pattern in the natural order of whole numbers is introduced when the child relates the number one to the number two, one and one more makes two. The kindergarten teacher should provide an environment in which this seed can germinate slowly and in many different ways. This can be done with blocks, children, discs, etc. Children can walk, jump or clap this "one more" pattern:

Two and one more is.....?

Three and one more is.....?

Four and one more is.....?

This "one more" concept will beused in later lessons using the Cuisenaire rods. It is too early to introduce it now with the rods.

Continue with "free play" activities.

Lesson 5.....Colors

Discuss colors with the children. The teacher might ask the group if all the colors of the rainbow are represented in Cuisenaire rods. Ask children to hold up: a red rod, orange, yellow,green (comment on the two green).

"What can you tell about the light green rod?"
(It's little or it's short)

"What do you notice about the dark green rod?"
(It's long or it's big)

Continue having children show a blue rod and a purple rod. Ask,"Are all the colors of the rainbow here?"
"Did we name all the rods?" Yes, we have a white rod and a black one too.

For "free play" today let each child build with a specific color. After rods are put away play the following game which is to reinforce recognition of rod colors

Note 1: For Teacher use only..... Color in rods are non-toxic vegetable dyes but for health reasons the rods should be handled properly. Color notation for rods is as follows:

w-white
r-red
g-light green
p-purple
y-yellow
d-dark green
k-black
n-brown
u-blue
o-orange

It is not necessary for children to learn notations. Color names will be soon replaced by number names.

Color families of reds...color deepens with length.

1. Red..... red, purple, brown
2. Yellow..... yellow, orange
3. Blue-Green.. light green, dark green, blue

Related activities

1. Prism... to show that the white rods belong to all rods,show how sunlight is filtered into colors of the rainbow by using a glass prism.

2. Color Mash... to show that black rods are made from all colors, mix a batch of paint by using all colors.

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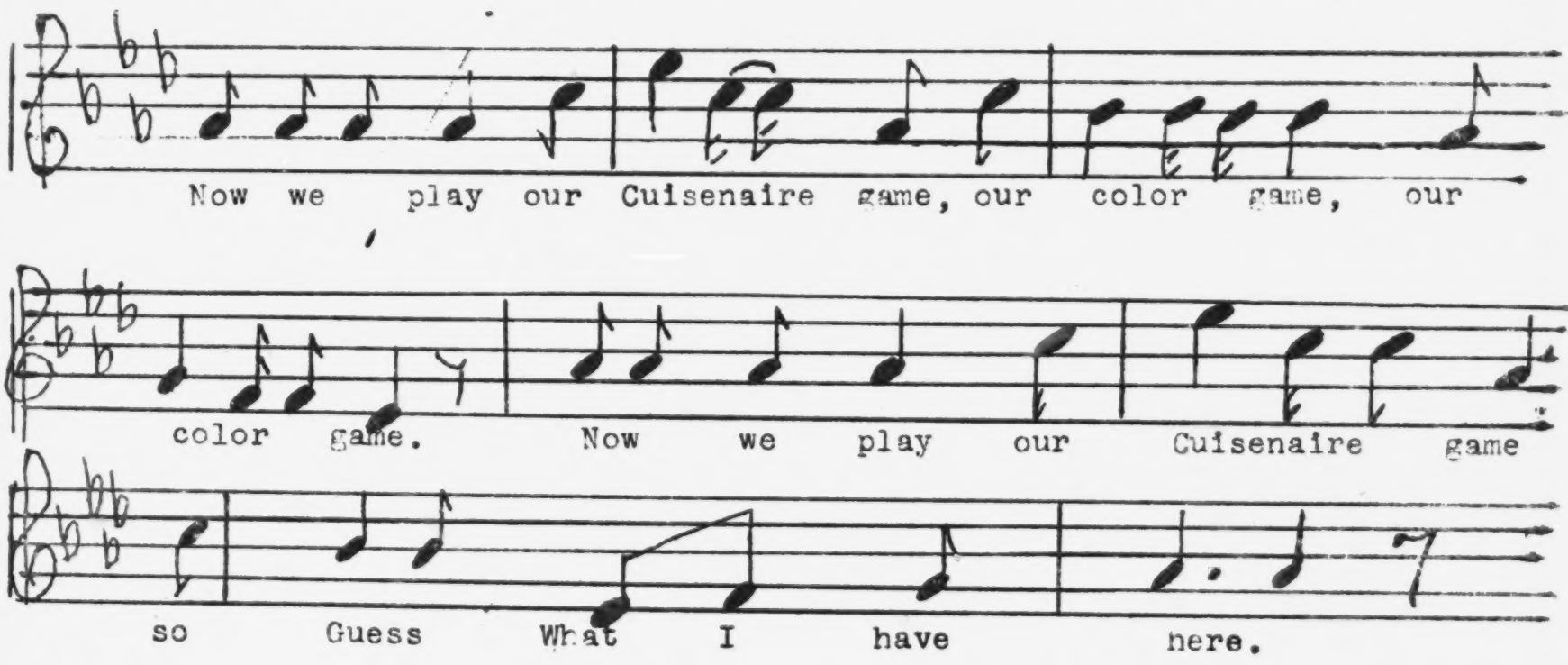
Cuisenaire Color Game

Procedure: Children sit in a circle
One child is Cuisenaire man. He carries about five rods in his hands and walks around circle in front of children as group sings to tune of Here We Go Round the Mulberry Bush.



The Cuisenaire man holds one rod in front of child. Child receives rod if he can tell its color and sits in the middle of the circle with it. Song is repeated until all rods are given out. The Cuisenaire man says to children with rods

"Hide your rod behind you.
I would like a Red rod."

Child with red rod gives it to him and returns to circle.

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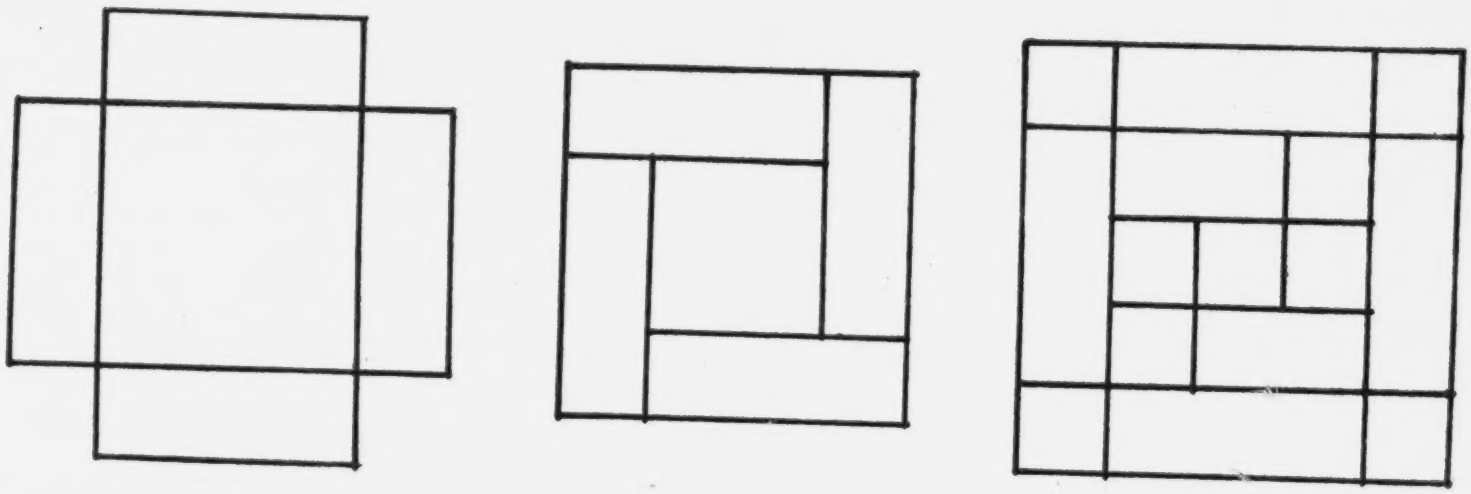
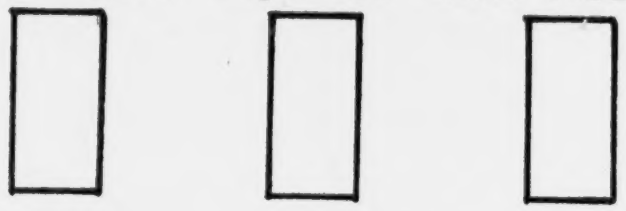
Lesson 6..... Picture Frame Game

This is a good exercise for children to gain skill in pattern sequence. Show children how to make a frame using four of the long rods (orange or blue). Any way will be acceptable. Allow children to fill in pattern.

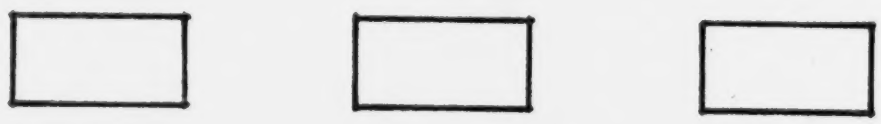


If child has any spaces ask," Which rod might fit in here?" Have child make another using a different size rod for the frame.

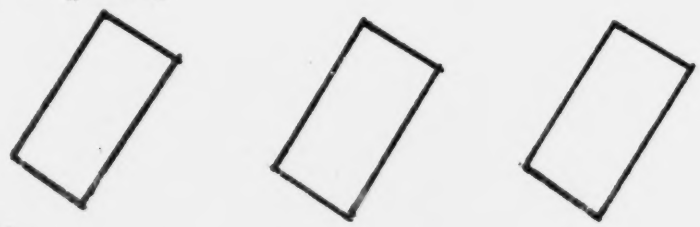
Lesson 7.....A. Show children a pattern of one rod repeated in the same position. Use the term "repeated" with children.



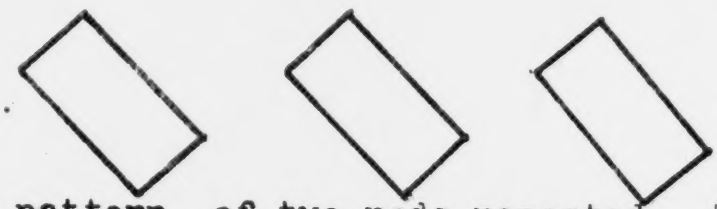
Have children make a pattern repeating one rod. Change position of this rod and make a different pattern.



Change position again.



Reverse positon.



B. Show children pattern of two rods repeated. Transparency 11 can be used at this time. Let only one pattern be seen. (Other patterns will be blocked out if a sheet of paper is placed over them.)

Direct child's attention to the two rods being repeated in the same position.

Direct children to examine the shapes and think about the pattern. Ask, "What would come next?"
Have children repeat and continue pattern with their rods.

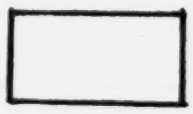
C. As children gain proficiency increase the number of rods and complexity of the pattern to be repeated.

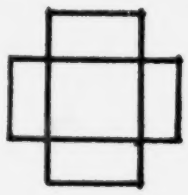
Transparencies 11, 12, 13, 14, go with this lesson.

D. Give the child opportunities to devise patterns with specific relationships or let him create his own.

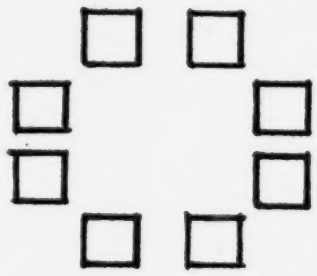
Lesson 8.....Geometric Shapes

Direct children to make a square shape by using the rods. Too much time should not be spent on the shapes at this stage. Later lessons will be more specific. Children will make the square in different ways. Some will make a solid. Others will make an outline.

Suggest children make a  rectangle.

Have children make a cross. 

"Can you make a circle?"
(Some will, using white rods)



"Can you make a triangle?"

Developmental Ideas in Math Using Cuisenaire Rods

If the "one more" concept has been introduced in the kindergarten mathematics program as suggested in Lesson 4, the children are ready for this lesson using the rods. The staircase pattern of the rods showing the increasing concept is a pattern we want children to discover for themselves. It is doubtful that kindergarten children will make this discovery without some stimulus from the teacher. The "one more" game may help lead into this discovery.

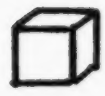
Lesson 9a..... Direct the children to play "one more" with the rods. Suggest they play it any way they please. Their neighbor will have a different idea and he will play it his way. This is good! Play the game "one more" their own way.

As the children are doing the activity, teacher can make inquiry of an individual child as to how he is playing "one more." Children are so ingenious when it comes to expressing themselves this way. Some will build with the rods flat and some will have them stand up.

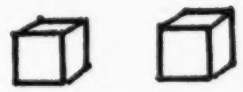
As a conclusion for this activity it is well for the teacher to show how various children have played "one more." If a child has made the staircase, save this one for last. Ask the child to tell about what he has done and point out to the children that each rod is a step higher than the next. Introduce the term "staircase" so children will become acquainted with it.

After the children have discovered the staircase pattern they are ready to learn relationships between the rods. This is a directed activity and is best when a teacher works with a small group.

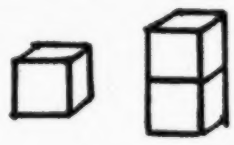
Lesson 10a....Ask, "Which is smallest rod?" (White)
Let's take a white rod and put it in front of us.



"Next to this white rod let's put another white rod."

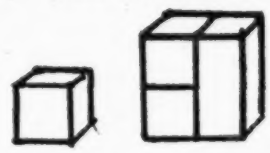


"Now let's add one more rod to this one."

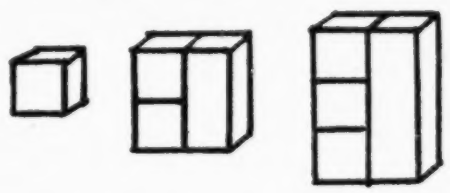


"Can you find a rod that is as long as the two white rods and put it next to it."

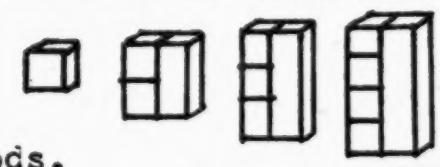
"What rod is it?" Yes, it is a red one.



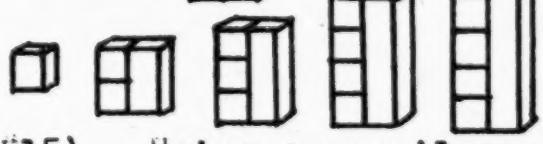
This time let's take three white rods.
Is there a rod as long as three white rods?
Put it next to the three rods.



Now let's put four white rods and see if we can find a rod that is the same size.



Do the same with five white rods.



At this point show the **transparency** (#15). Using a pencil as a pointer show them again that a red rod is the same as two white ones; light green equals three white ones; a purple is equalivalent to four whites and a yellow is the same as five whites.

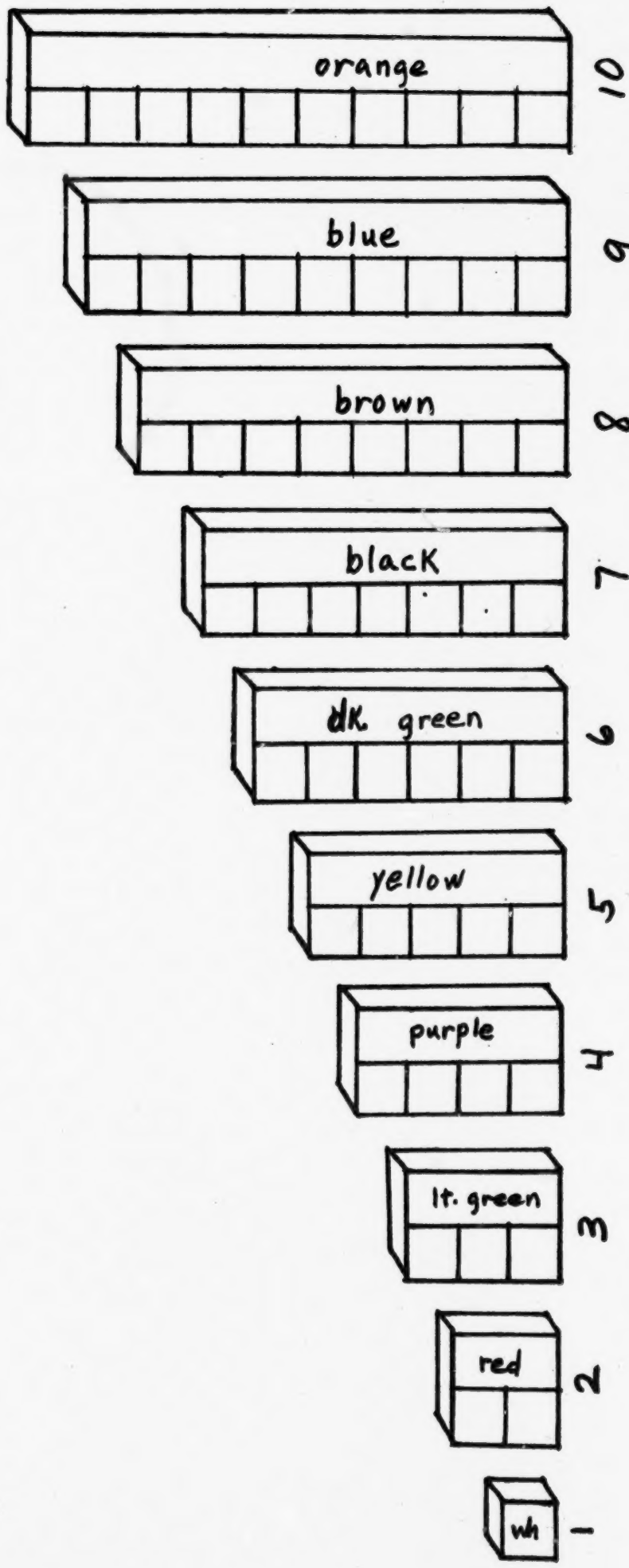
Ask: "If we call the white rod 1, what can we call the red rod?
Yes, 2.

"If the white rod is 1, what can we call the light green?" (3)

Each time it is best to say "If we call the white rod 1." Rods are multivalent which means rods can take on different value depending on what we define as 1.
Continue question for purple and yellow.

Lesson 10b....Have children find rods equivalent to 6,7,8,9,10 white rods and proceed as in lesson 10a.

Note..Make a three-dimension bulletin board of rods for easy referral. (See example on page 14)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10
blue
9
brown
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dK. green
6
yellow
5
purple
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3
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1

The next several lessons invclve children in activities that help them learn number names of the rods and to discriminate between them.

Lesson 11.....Guess Which One?

A. Direct children to choose two rods such as; a 2 rod and a 9 rod and hide them behind their backs.

Say:"Show me the 9 rod."
"how did you tell?"
"What color is 9?"

Continue for the combination of rods. At first choose rods which vary greatly and then choose rods closer in size.

B. Teacher says: "I'm not the longest or the shortest rod. I am between 2 and 4. Who am I?"
Or she may say: "I am longer than red but shorter than purple."

C. Do above activities using three rods.

Note to teacher: Introduce the following words for math vocabulary:

short - longer	littler - bigger
shorter - longer	smaller - larger
next to - between	smaller than - larger than

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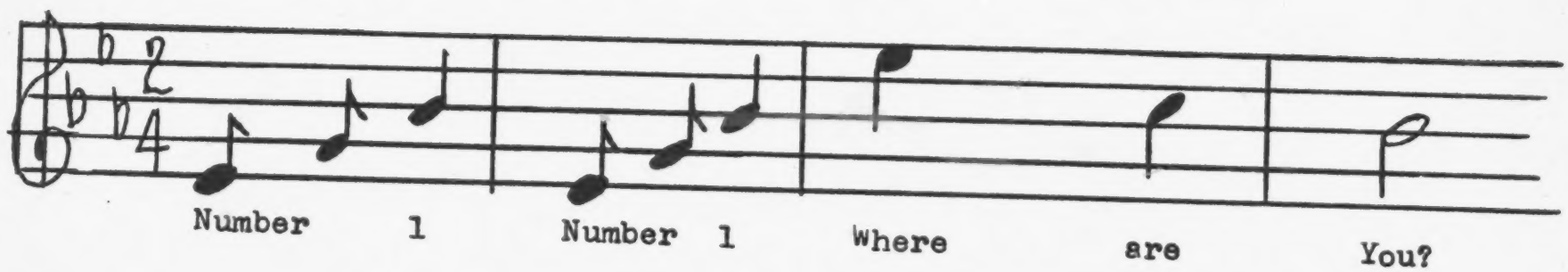
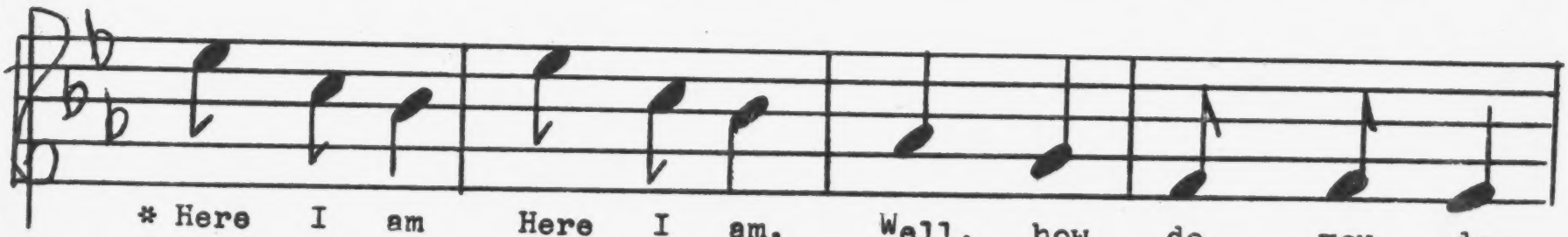
Lesson 12.....Number Game

Procedure: Each child is given a Cuisenaire rod. Children sit in a circle with their hands behind them. Children sing to tune "Tommy Thumb."





* On words "Here I am" children who have the 1 rod stand up. They sit down at end of song. Song is repeated for number 2, number 3, etc.

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Lesson 13.....Grab Bag

Several rods (start with 3) are put in a bag or box. Child reaches in and takes one. He tells which one he has selected before he sees it. The teacher may ask:

"How did you know?"
How could you tell?
"What makes you think that?"

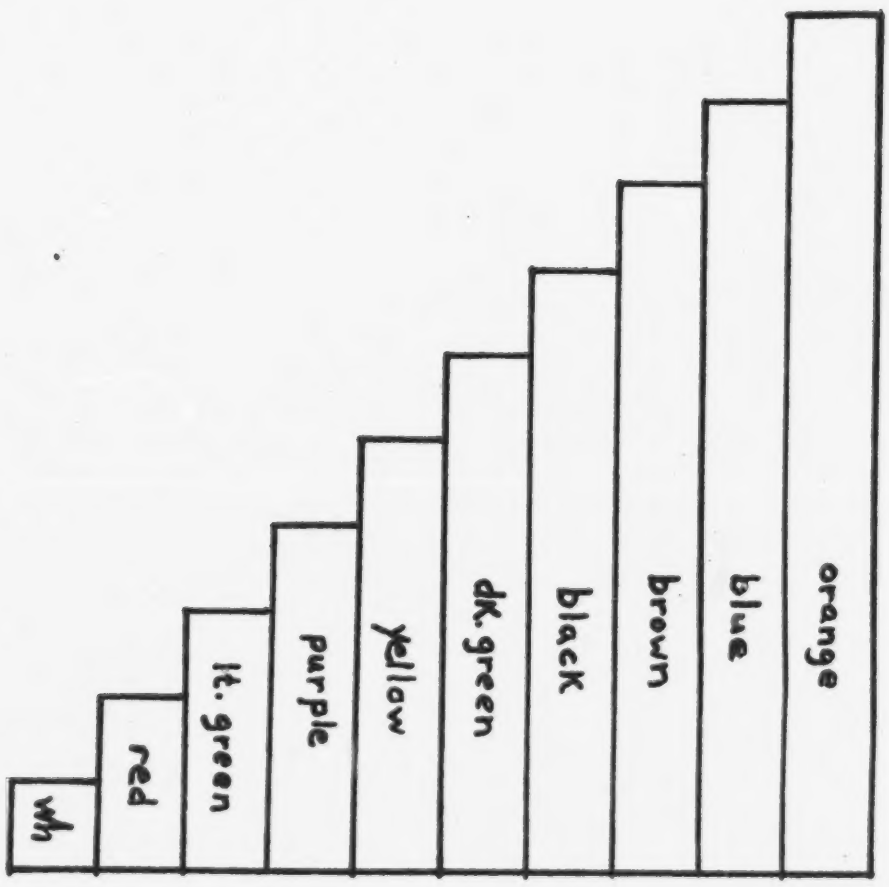
Another variation of the game is for the teacher to put several rods in a bag. A child is requested to put his hand in and grab #3 or the light green rod.

While children are becoming acquainted with the names of the rods, it is well to use both the color name and the number name. (with the white rod being 1)

Lesson 14.....Cover Up

Children make an array of rods on their table. The staircase pattern is a good arrangement. A paper towel is put over each child's rod. Then he feels under the paper for a specific rod as directed.

Another activity that the children enjoy doing is to cover a miscelaneous arrangement of rods with a paper towel. Children reach under paper and choose a rod to build steps.



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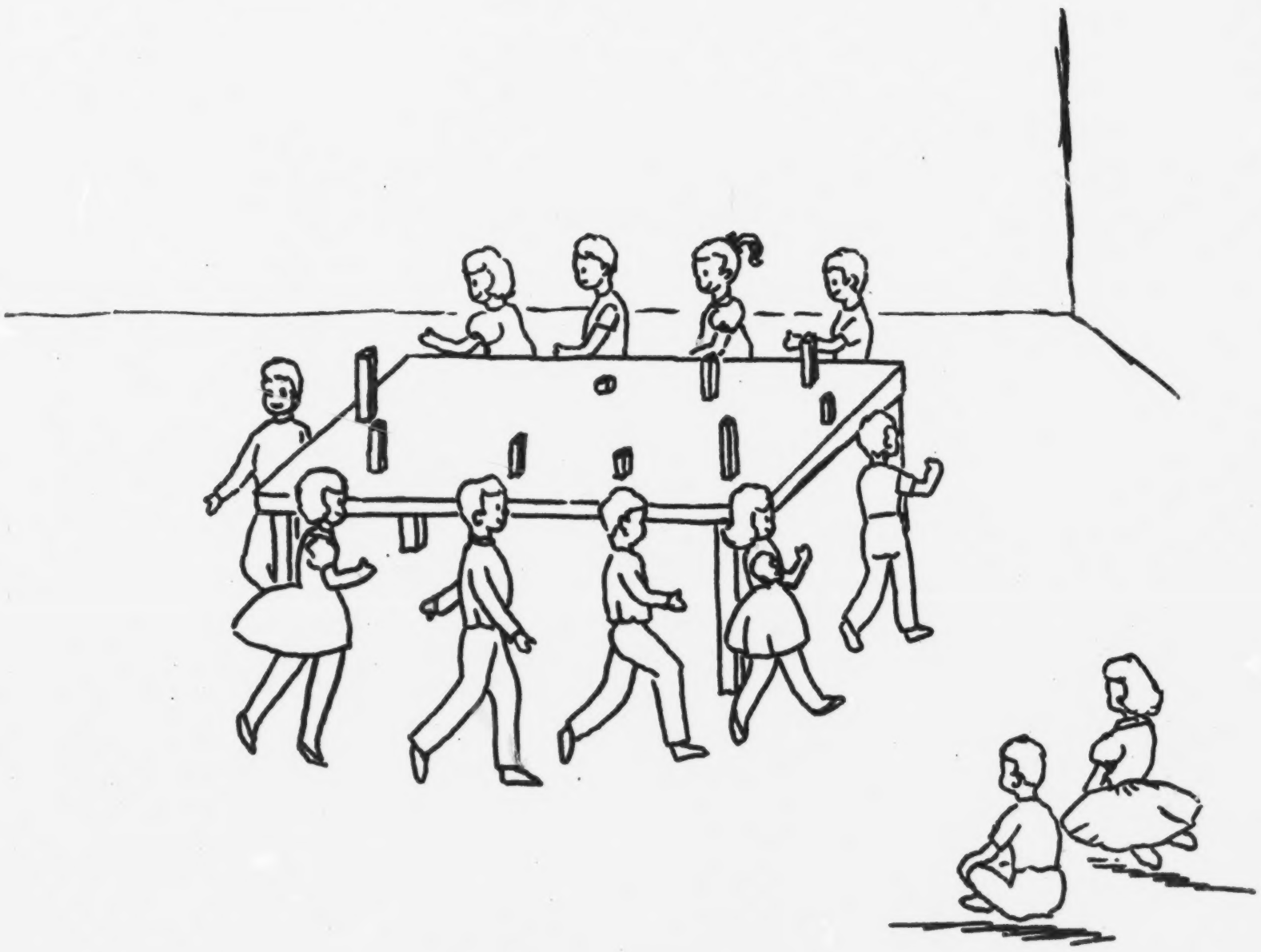
Lesson 15.....Musical Rods

This game is played like musical chairs. Rods are placed on tables and children march around stopping by a rod when music stops. If each child tells the color and number of his rod he plays the next round. Child who has no rod or misses his turn sits down.

Remove a few rods each time so there are less rods than children playing.



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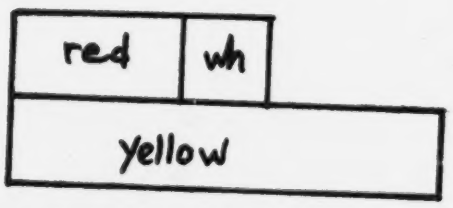
Lesson 16.....I Spy

This game is the beginning of addition using the rods. Use both color name and number name. Teacher begins game:

"I spy with my little eye."
"A rod that is as long as red and light green or 2 and 3.
"Show me with your rods."

Direct children to put the red and white rods "end-to-end" and put the yellow rod next to them to see if they are the same.



If we put the green rod first and then the red rod, would it still be as long as a yellow rod?

Note to teacher: The expression "end-to-end" is used in this lesson. Introduce it and start using it with the children.

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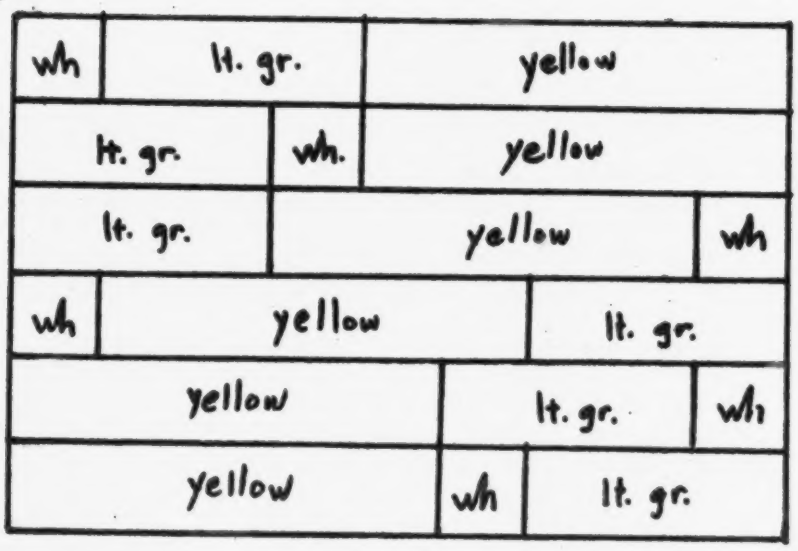
Lesson 17.....Train Game

A "train" with Cuisenaire rods consists of two or more cars (rods) placed "end-to-end". Trains can have names. A train of a red (2) rod and a light green (3) would be a 5 train. Cars on a train can be reversed. A light green (3) and a red (2) would still be a 5 train. Use transparencies # 1*, 2*, 3*, 4*, 5*, 6*, 7*, 8*, 9*, and 10* for this lesson.

Direct child to make trains of two cars. Then 3 cars.

Note to teacher: Encourage the reversal of patterns.

Challenge to children: If you have a train of white, light green and yellow, how many different ways can you arrange the cars: Show me.
(Answer: 6 ways.



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Lesson 18.....Squares

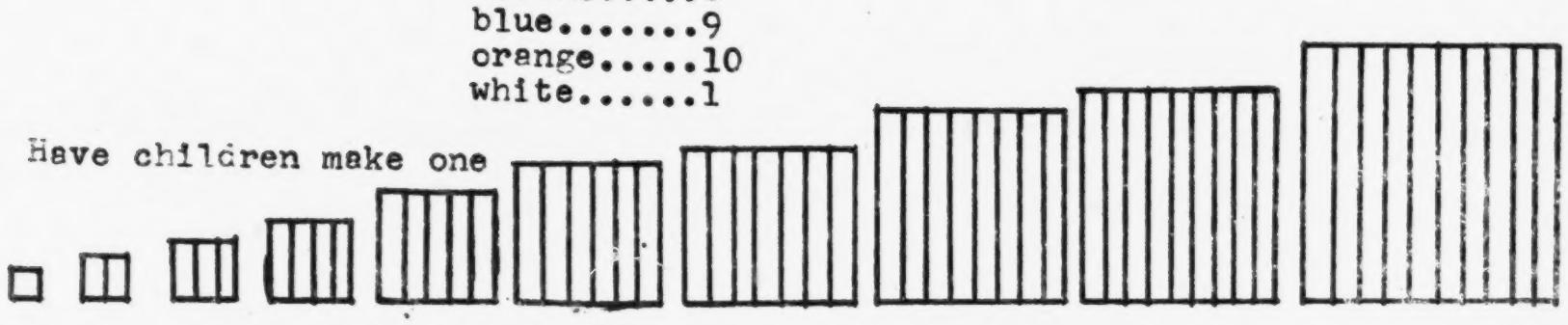
Children are asked to make a square using only one color rods. Teacher comments on different squares different children have made.

Direct children to make a square using as few red rods as possible. How many does it require? (2)

What is the least number of rods we need for a light green square? (3)

purple.....4
yellow.....5
dk. green..6
black.....7
brown.....8
blue.....9
orange.....10
white.....1

Have children make one



What can you tell about our squares? If you arranged rods going the other way would you still have a square?

Note to teacher....Discoveries of patterns is one of our goals in math.

Extra Challenge to Children.....Can you make a square using all the Cuisenaire rods. You may have to use 2 of each. After children have worked on this problem several times show them the answer key...Transparency

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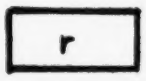
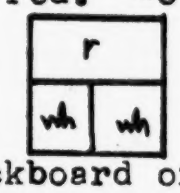
Lesson 19.....Train Game for Two

By using the train game children are introduced to the idea of addition and subtraction. Kindergarten children are exposed to these ideas and are led to discover facts. They are not expected to master them. The experience of putting rods together to make a longer rod and taking a rod away will add to their background which leads to better understanding.

Teacher directs lesson:

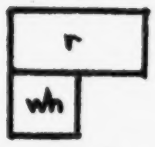
A. Put a 2 or red rod in front of you. 

How many white or (1) rods placed end-to-end will make a train as long as the red rod? Yes, a white or 1 rod and another white rod makes a train as long as the 2 rod. We can look at our train and read the story it tells.

1+1 = 2 (one and one make two) 

Teacher writes number story on blackboard or overhead projector.

B. Now, if we take one white rod away, how many white rods are left? We can say:

2-1 = 1 

How much longer is a red rod than a white?

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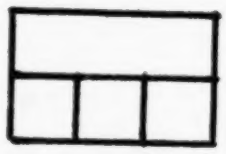
Lesson 20.....Train Game for Three

A. How many white rods does it take to make a white train as a 3 (light green) rods?

Do it.

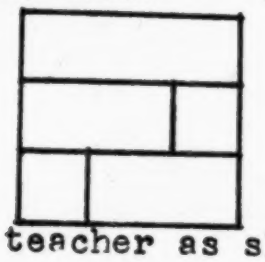


Who can read the story our train tells?

Say; If white is 1, three whites are as long as 3.

1+1+1 = 3 (Write for children to see)

B. This time use two different colored rods and make a train as long as the 3 rod. Can you make another train? Tell me what train you discovered?



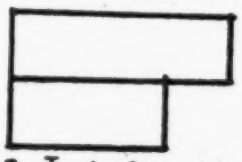
Children tell teacher as she writes it.

2 + 1 = 3 and 1 + 2 = 3. Bring out the fact that the first train is the reversed of the other. This is the commutative law in math.

C. In discovering the subtracting facts it is simpler for children to see if one two car train is used at a time.

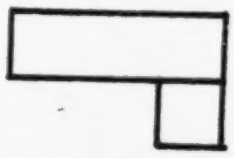
Put the 2 (red) and 1 (white) train under the 3 rod. The 3 rod is how much **longer** than the 2? If I take the one rod away, what is left?

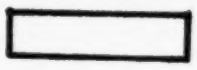
3 - 1 = 2



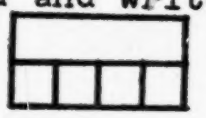
Now put it back. If I take the 2 rod away what is left?

3 - 2 = 1



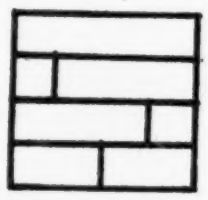
Lesson 21.....Train Game for four 

A. Start with a 4 rod in front of each child. Ask them to make trains as long as the 4 rod using white ones. Ask children to read what they have found and write story.

$1 + 1 + 1 + 1 = 4$ 

Reinforce idea if white rod is 1, four white rods make a purple rod.

B. Let the children use 2 rods, and see how many different two car trains they can find as long as the 4 rod.

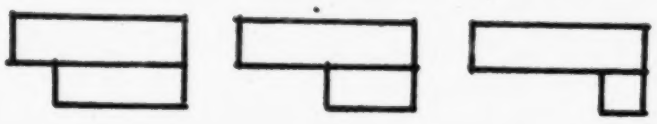


$1 + 3 = 4$

$3 + 1 = 4$

$2 + 2 = 4$

In discovering the subtraction facts let children work with one two car train at a time

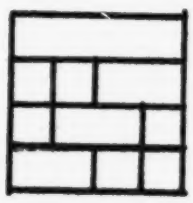


$4 - 1 = 3$

$4 - 2 = 2$

$4 - 3 = 1$

Challenge children to make a 3 car train for 4 and read story they found.



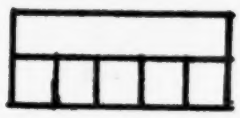
$1 + 1 + 2 = 4$

$1 + 2 + 1 = 4$

$2 + 1 + 1 = 4$

Lesson 22.....Train Game for Five

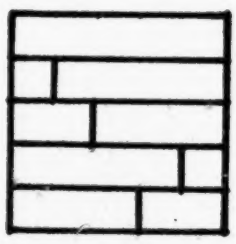
A. Children make train using white rods.



1 + 1 + 1 + 1 + 1 = 5

If the white rod is one, five white rods would be as long as a yellow which is the 5 rod.

B. Children make trains using two different colored rods.



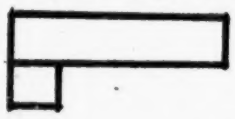
1 + 4 = 5

2 + 3 = 5

4 + 1 = 5

3 + 2 = 5

C. Subtraction facts are discovered by children using a two car train and taking one of the rods away at a time.



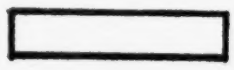
5 - 4 = 1

D. Children make 3 car trains.

E. The addition law for zero could be introduced. The

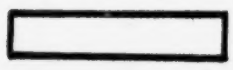
a) Teacher....Let's start with nothing on our desk. What name do we give to the number which means "none?" (Zero)

So we can say on chalkboard 0
Now lets add a 5 rod to it and place the yellow rod on our table.
0 + 5 is how much? What do you have in front of you?

0 + 5 = 5 

b) At another time have children start with a 5 rod.

If we add zero to it what will you have in front of you? (5 rod only)

5 + 0 = 5 

Lessons 23 through 32.....Train Games for (6,7,8,9,10)

Children should have enough familiarity with name games to proceed on their own. It's a good day's activity to find addition facts for 6 and another day's activity to find subtraction facts for 6. Subtraction facts need more teacher's guidance. Teacher summarizes and write facts on chalkboard. Children can find subtraction facts for three car trains, too.

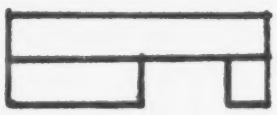
Examples:

3 + 2 + 1 = 6

If a 1 rod is taken away, what is left?

6 - 1 = 3 + 2

Put the 1 rod back. This time take a 2 rod away.



6 - 2 = 3 + 1

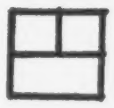
Put the 2 rod back. This time take away the 3 rod.

6 - 3 = 2 + 1

Lesson 33.....Twice Tales

"Twice Tales" is a poem from the World of Christopher Robin by Milne. Children have fun doing the twice tales with the rods.

Say: A 1 rod and a 1 rod is as long as_____.



Write on board 1 + 1 = 2

A 2 rod and a 2 rod make_____.

Write on board 2 + 2 = 4

A 3 rod and a 3 rod make_____.

Write on board 3 + 3 = 6

Continue with rods and write: 4 + 4 = 8

5 + 5 = 10

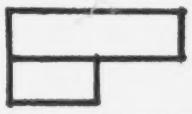
Show the child the individual activity cards which they can use on their own during choice time.

Lesson 34.....Fractions - $\frac{1}{2}$

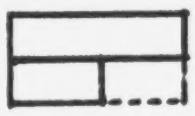
If the concept of one half has been established in the math program, the rods illustrate this concept and gives the child a new experience with fractions.

A. the pupils start with any of the even number rods as a 4 (purple) rod. Teacher says:

"If this rod was cut into half, that means into two parts that are just the same, how long would half of the four (4) rod be? Show me with your rods.



Is there something you can do to prove the 2 (red) rod is one half the 4 rod?



Note: Work towards the concept that there are two 2's in four so that one 2 would be one half of 4.

"We show this relationship by writing $\frac{1}{2}$ of 4 is 2 or in math language we write $\frac{1}{2} + 4 = 2$."

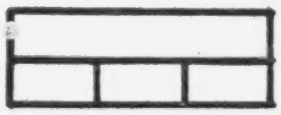
B. Children continue and find one half of 2,6,8,10,12, etc.

Challenge to children: Ask child to find $\frac{1}{2}$ of the 3 rod? Can this be shown with the rods? (no, because the 3 rod cannot be divided into two equal parts.)

Lesson 35.....Fraction - 1/3

To show third, rods used should be multiple of threes as 3,6,9,12,etc.

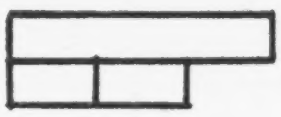
A. Have child put a 6 (dark green) rod in front of him. Can you find three rods the same color that will make a train as long as a 6 rod?



Yes, there are three red rods in 6. Each red rod is one of three parts which are the same. Let's take one red rod away. Since the red rod is one of three, we can say that the red rod is one third of the dark green rod.

Write 1/3 x 6 = 2

Since there are now 2 red rods left under the dark green rod, how many thirds are left? Yes, two of the thirds are left.



We write the fraction two thirds $\frac{2}{3}$. The three in the fraction tells us the dark green rod was divided into three parts. The 2 in the fraction tells us we have two of these parts left.

B. Direct children to find $\frac{1}{3}$ of 9,12.

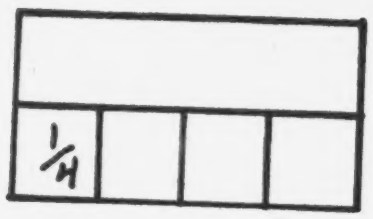
Challenge to Children: Can you find $\frac{1}{3}$ of the 8 (brown) rod with rods?

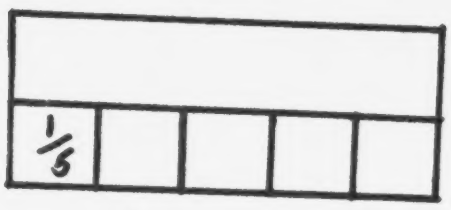
Lesson 36.....Fractions - $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$, etc.

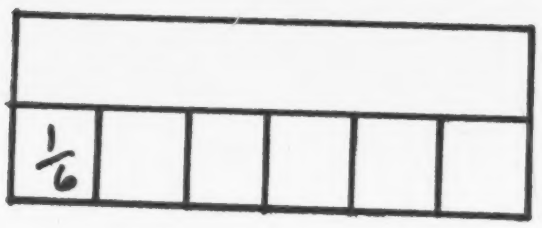
To illustrate the $\frac{1}{4}$ fraction, use the 4 or the 8 rod and have pupil find one of the four parts.

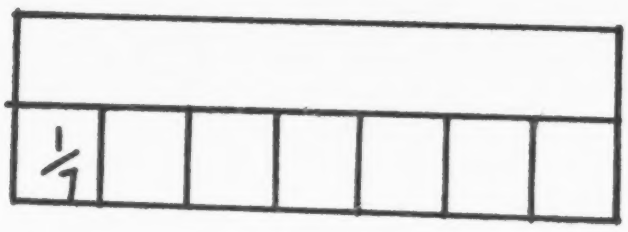
For $\frac{1}{5}$ use the 5 rod and the 10 rod and have pupils find one of the five parts.

For $\frac{1}{6}$ use the 6 rod and the white rods. A white rod would be $\frac{1}{6}$ of the dark green one.





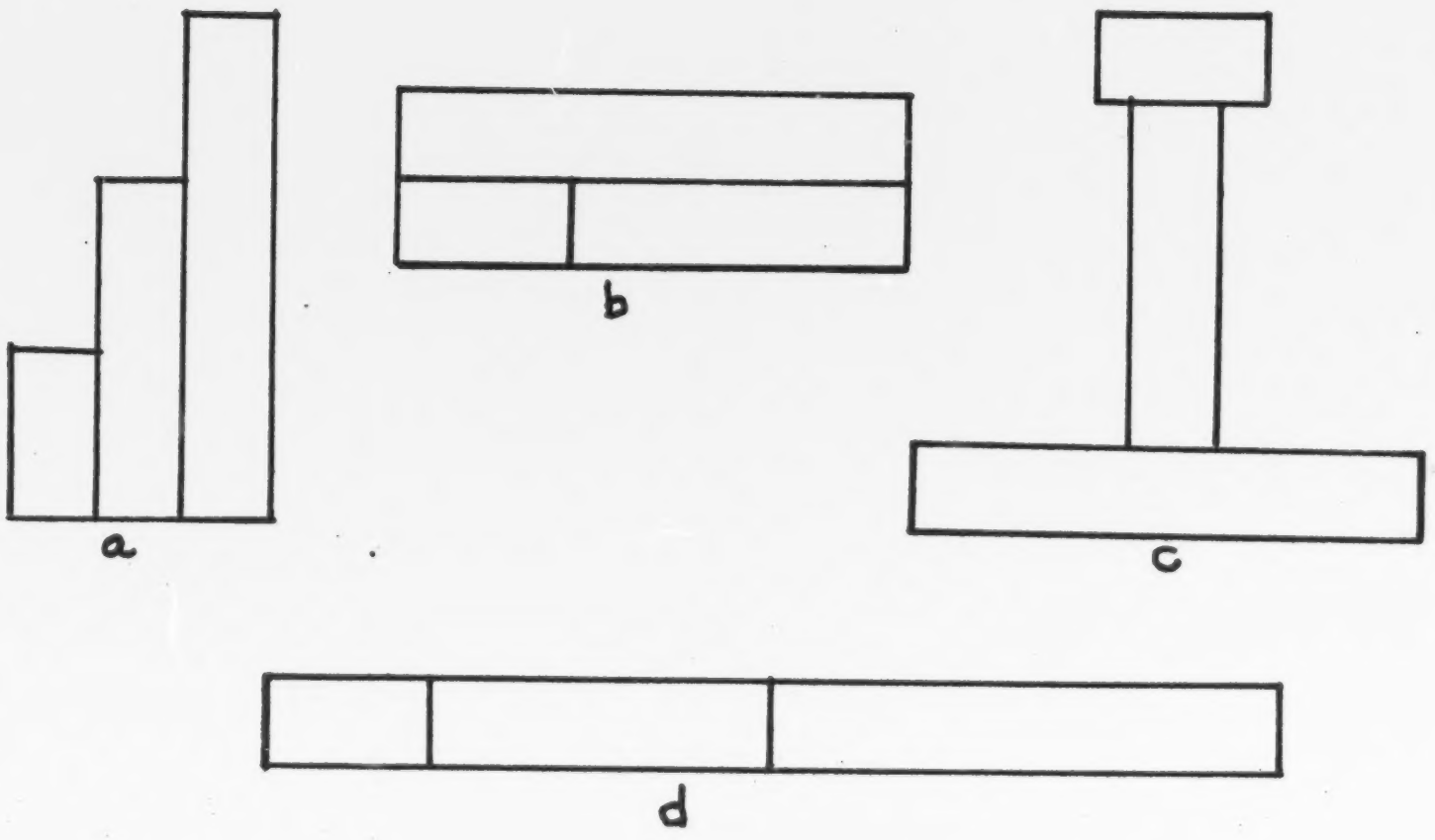




Lesson 37.....Conservation

Cuisenaire rods can be used to give the children an exercise in conservation of surface area: objects placed on a surface can be arranged in different ways without changing the surface area.

A. Children select three rods (at a time) as a red, purple, and dark green rod and make different groupings with them as:

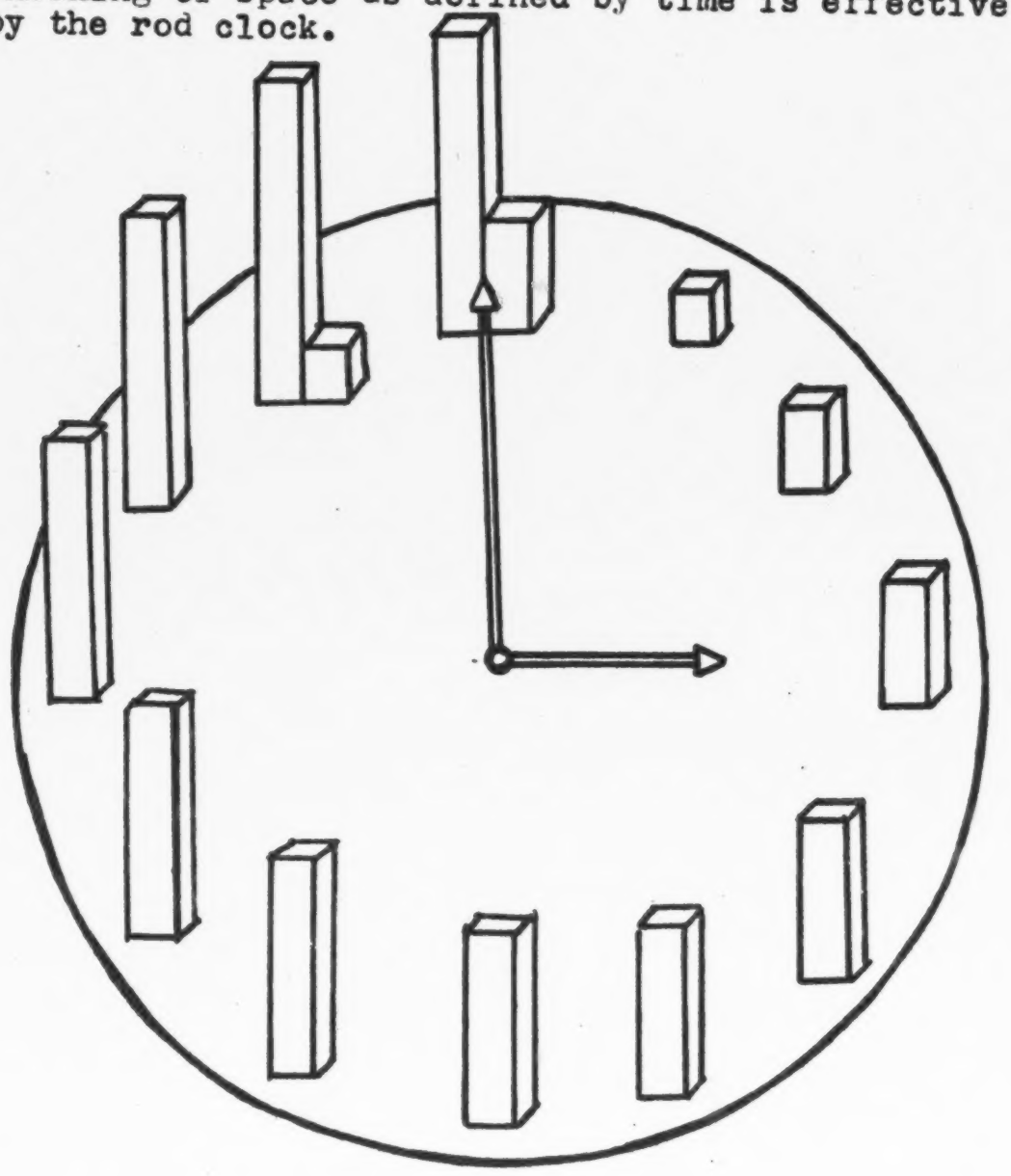


With different groupings (a,b,c,d) before them ask children one or more of the following questions: „Imagine that the rods are candy", 1) In which (group) would you have the most candy to eat? What makes you think that?
2) In which would you have less to eat?
3) In which would you have the same?
How could you prove it? Is there something you could do to be sure?

B. Exercise can be repeated increasing the number of rods used.

Lesson 38.....The Meaning of Space

The meaning of space as defined by time is effectively demonstrated by the rod clock.



3:00 O'Clock

The children could arrange their rods in a paper plate to represent the clock face.

Lesson 39.....Comparison

When objects are compared, they are the same size, larger than or smaller than each other. In math we use symbols , , , to show these relationships.

A. Perhaps the term "equals" is not in the kindergarten child's vocabulary but he can readily understand things are the same.

Rods the same color are the same so they are equal.

Write 2 = 2

Two red rods make a purple rod.

Write 2 + 2 4

Different color rods are not the same.

In math we show this relationship by the symbol, $\neq$

Write $4 \neq 5$

A purple rod is not equal to a yellow rod.

Write $1 + 3 \neq 2 + 3$

B. A (6) dark green rod is larger than a (5) yellow rod.

Write $6 > 5$

The point of the $>$ always points to the smaller number. We can express this relationship another way since the (5) yellow rod is smaller than the (6) dark green rod.

Write $5 < 6$

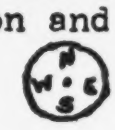
Again the point of the symbol points to the smaller number.

Examples: Choose the symbol to use with these rod stories. Put the correct symbol in the box. Use rods.

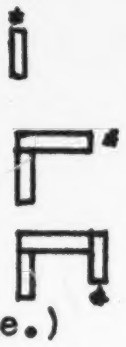
3 ☐ 3, 8 ☐ 9, 7 ☐ 9, 1 + 2 ☐ 2 + 2, 1 + 1 ☐ 2

Lesson 40.....Direction

Let each unit in the rods represent one mile. Children are asked to travel specific distances going in the following direction by using the rods. The key is for child to put his finger at the end of the rod showing direction and start his new direction from where his finger is each time.



1. Go North 2 miles (use red rod)*
2. Go East 3 miles (add light green)
3. Go South 2 miles



(* shows where child places finger each time.)

4. Go South 4 miles (use purple rod)
5. Go West 6 miles
6. Go South 2 miles